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ABSTRACT

This paper reflects SUNY's (State University of New York) efforts at applying technology and telecommunications to improve the quality, accessibility, and productivity of educational programs and to enhance the return on the public investments in education. It is built upon the experiences of SUNY campuses, local schools, and industry which have focused on developing community application designs that are affordable and educationally sound. This paper outlines why SUNY leadership is necessary to foster community collaboration, shows the community benefits to be derived through assumption of this leadership role, and suggests actions for those willing to accept the challenge. Adult learning, technical training, workplace literacy, homebound instruction and community learning sites are among the goals of the proposed community collaboration. Community leadership strategies discussed in section one include: (1) educational significance; (2) wide community applicability and access; (3) integration with sound educational practices and among the technologies themselves; and (4) collaboration among key community partners. Section two, "Needs and Directions," discusses nine issues to be considered in making a community effort; and "Where Are We Now?" compares the myth versus reality of educational technologies. In section three, 13 requirements of a community learning system design are outlined, and ten steps toward taking a community leadership role are presented in section four. Finally, section five argues that a community lifelong learning system is possible, and must be done. Specific SUNY community and statewide learning technology projects are discussed in an appendix. (MAS)

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SUNY Campus Leadership as a Catalyst for Developing Virtual Community Learning Systems

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April 1995

NOTE:

This paper is an adaptation of an address and paper entitled "*Creating the Learning Community: Considerations for the School Superintendent as Community Learning Manager*" delivered in Cambridge, Massachusetts at MIT to the New England Conference on Technology and Education held on April 1, 1995.

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Introduction

This paper is a reflection of the SUNY experiences in several contexts to apply technology and telecommunications to improve the quality, accessibility, and productivity of educational programs and to enhance the return on the public investments in education. It is not a theoretical paper. Rather, it is built upon experiences with SUNY campuses, local schools and industry which have focused on developing community application designs that are affordable and educationally sound (some described in the Appendix). Leadership for these community programs may or may not have been provided by SUNY campus staff. However, it is clear that SUNY cannot afford to pursue the development of its own network nor, for that matter, can the K-12 or other public systems of education and training delivery. Rather, in collaboration with others, we must develop the system requirements for networks that will be built and maintained by the private sector telecommunications providers. The ultimate consequence of this collaboration with a number of community interests is the reduction of start-up and expansion costs for public education since the community network is amortized over a far broader array of community applications. It also removes public education from the business of building, maintaining and replacing telecommunications facilities which seemingly become obsolete overnight. Interconnection among community networks across the state will ultimately come as modes of delivery become scalable, as market demand emerges and as restructuring decisions are made that require such exchange.

This paper outlines why SUNY leadership is necessary to foster community collaboration, indicates the community benefits to be derived through assumption of this leadership role and provides suggested action steps for those willing to accept the challenge.

I. The Promise

The media is filled with news of the emerging "electronic highway" with promises of a myriad of information and consumer services brought to living rooms, the work place, schools and colleges at all levels across the United States. Economic and political viability of such potential is underscored by the frenzy in the corporate telecommunications sector to joint venture, merge, and acquire as well as by the government exposure and support being demonstrated by the President, Vice President and many federal agencies. A recent projection by

Forrester Research of Cambridge, Massachusetts, indicates that the "on-line market," fueled by data sharing and purchase of goods and services on a global scale, will grow from its current \$530 million to a \$3 billion industry by 1998. This, and other projections, make the economic incentives for the development of community-accessible, multi-media consumer services very clear.

For those of us in the education and training enterprise, the "learning market," the opportunity to deliver multi-media education and training to living rooms across the country via cable television, telephone services, and other emerging wireless carriers, represents an exciting new perspective on what the lucrative "home improvement" market will soon be. Students needing supplementary assistance or seeking enrichment courses; parents seeking a GED, college courses, or training to improve job skills; and corporations desiring to upgrade employee competencies will all soon have these lifelong opportunities delivered to homes, the workplace, and community learning centers all across the United States and beyond. New technical capacity will combine the power of multimedia, computer-assisted-instructional systems and the motivational attraction of video, sound and simulation in an interactive, multi-media electronic array of lifelong learning opportunities within reach of everyone in the world. As professional educators, we must become involved in the shaping of these learning systems, keeping the learners and their needs as the central focus of our efforts. Should SUNY ignore the community leadership role it can play in this promising evolution, the probable outcomes are:

- Systems built for systems sake (not educationally sound);
- Multiple, costly, incompatible efforts across the span of lifelong learning;
- Insufficient aggregate community resources to achieve high quality, cost-efficient learning system applications;
- Little public support for public education learning technology initiatives;
- Learning system leadership migration to non-educators;
- Emergence of private learning system alternatives;
- An exacerbation of the "have/have not" situation creating deprived learning ghettos;

- Stagnation and out-migration of business and industry.

Recent conversations with several federal, state, regional and local educational leaders have not been encouraging regarding the state of public education and the likelihood for bold new leadership. On a national scale, debilitating budget cuts, leadership transition and an impatient, overtaxed public has created a morass of political "initiatives" engulfed in the chaos of reorganization where those focused on the learner and learner achievement of competencies struggle day by day against odds that will seemingly triumph.

SUNY must overcome those odds and exercise strong leadership now if we are to avoid the implications of inaction noted above. In every region across New York State, whether urban, suburban or rural, there is an educational leader with the motives, knowledge and skills to become the primary force behind the promise we have been hearing so much about. In New York State, SUNY can provide that leadership influence on developing successful, cost-effective, community learning systems.

Key Community Leadership Strategies

Nearly all public and private educational organizations from K-12 to adult continuing education have embraced the promise of the new and emerging technological capacities for the purposes of increasing learner access, improving the quality of teaching and learning, and enhancing the productivity of the institution, the faculty, and the learners themselves. The efforts to harness educational technology pursued by educational organizations should incorporate several basic assumptions or strategic underpinnings. First among these is the assumption that whatever is developed that integrates the emerging technologies, the finished product or process will be educationally significant. That is, it will meet real learning needs, it will enhance or extend access either geographically or across time, it will demonstrate positive, cognitive and affective results, and it will enhance the productivity of the organizations, businesses and individuals involved. The pursuance of this key strategy that holds educational significance as the core outcome requires educational leadership. The importance of it is underscored by a recent survey of companies conducted by the National Association of State Development Agencies (1994) that illustrates when companies look for incentives to move to or remain in a state, the incentive ranked number one is "worker education/technical training programs" (92%). Worker education and training is a lifelong endeavor and its relationship to the economic health of a community, state or region is brought into much clearer

focus by this survey. Moreover, the loss of New York jobs to Georgia, South Carolina, Kentucky and other states can, at least to some degree, be traced to the education and training incentive packages offered to corporations by those states.

A second desirable strategic objective is making the application as widely available in the community as possible. This objective relates to the emerging shift in the role of professional educators from disseminators of information to managers of learning. The most creative of our SUNY leadership will view that new role as not just related to the current model of instruction, confined to classroom settings or campuses, but have the vision to see that this new model, through tele-exportation of interactive, multimedia learning experiences, extends to the community itself (and well beyond). Much the same as the faculty member's role shifts to learning manager, the **SUNY campus policy level leadership role shifts to that of architect of community learning systems**. Such a role assumes that the SUNY leadership is aware of the community learning needs and can engineer and/or arrange for the capacity to deliver learning opportunities needed by local corporations, students in need of remediation, workers seeking to upgrade skills to enable new job opportunities, public assistance recipients, family members seeking employability skills, the disabled who cannot leave their homes, non-English speaking workers, incarcerated youth serious about re-entering the job market as well as the "traditional" K-16 learners. The new technological delivery systems can now and will continue to improve the provision of capacity that is widely applicable to a variety of learners in a variety of community sites.

The third underlying assumption of a deliberate effort to effectively deploy technology for community educational purposes must be to work toward the integration of the technology in support of what we know is solid learning theory and sound educational practice. Also, it is important that educators be sufficiently informed of the technological capacities to oversee and suggest how the technologies might be integrated among themselves to most effectively address the objectives of access, quality, and productivity. Guiding this convergence of technologies is a key role that SUNY can play by directly participating in the development of learning system requirements at the community, regional and state levels.

Last, as is evidenced by the foregoing assumptions, it is impossible for any current public or private educational organization to undertake deliberate and effective efforts to design and develop learning systems without doing so in collaboration with others (the learning consumers, other educational and training organizations, organizations in the commercial sector representing the

educational software and hardware development sector, and those corporations involved in the development of regional, national, and global telecommunications transport services). With the removal of distance, time and geopolitical constraints, the education/training monopolies will give way to new organizations with blurred boundaries and loose structures that reach into a number of frontiers and built upon hybrid collaborative relationships with the education, training, knowledge and business sectors. This should come as no surprise to educators since this hybridization is clearly evidenced in the very curriculum matter we teach such as biotechnology, geophysics and ecopolitics. This hybridization is evidenced across the SUNY and K-12 sectors by 3-1-3, 2+2, Tech Prep and other high school/ SUNY articulation programs. It is also evident across school and business sectors by numerous work-study programs.

These underlying strategic elements of...

- educational significance,
- wide community applicability and access,
- integration with sound educational practice and among the technologies themselves,
- and collaboration among key community partners

...are central to successful efforts to apply and shape the new learning technologies in support of resolving this country's persistent and difficult education and training needs from the community up. With effective leadership, they are also the essential elements that will enable and guide the evolution of the traditional K-16 public education system into a dynamic, lifelong learning system available virtually anywhere.

II. Needs and Direction

The new turbulent phase of global markets and economies we find ourselves competing in is at the foundation of this emerging revolution in the education and training sector which is leading to a new "learning industry." Ultimately, this industry will be much more integrated with consumers and other providers in a seamless virtual delivery system. The need for SUNY to take bold leadership in pursuit of improvements in our system of education and its relationship to the success of New York's economic competitiveness is clear.

One can easily recite the litany of studies and reports accomplished over the last decade that point to deficiencies in our K-12 public education system, and underscore the importance of developing a new model for learning and training.

There is an array of state and national efforts labelled "Systemic Initiatives," "Systemic Reform," "School System Restructuring," and there has been a focus of attention given by Governors and the previous and current administrations at the national level resulting in agreement regarding "national education goals." These highly visible efforts have all been undertaken because the needs are abundantly clear and the goals of a myriad of fragmented, publicly funded programs are designed to address those needs.

In the post-secondary sector, similar reports and initiatives have been developed, many that indicate the lack of relevance between courses of collegiate study and jobs in the market place. Other reports indicate the frightening extent to which public university systems supplement the education of entering freshmen to prepare them to achieve a sufficient level of basic skill competencies to operate effectively in their freshman year. It is reported that the SUNY system needs approximately \$75 million per year for this purpose. Consider what the national amount must be for supplementing the education of high school graduates to enable reasonable pursuit of freshman college coursework!

The effect of the recession and the resulting number of displaced workers has caused a tremendous need for the retraining of our manufacturing-based workforce. In the corporate sector itself, education and training is reported to be an enterprise representing an annual magnitude of \$40 billion.

Though the needs are clear in all of the learning sectors in our country and the suggested solutions are abundant, this paper focuses on the steps SUNY campus leadership can take in New York to play a vital role in the shaping of the new learning industry at the community level.

In terms of pursuing community applications of the new and emerging learning technologies, it is important that we draw upon the educational research knowledge base, learning theory, and what we know and have documented about good and sound educational practice. Given that context of New York State's needs and the underlying strategic elements, any deliberate community effort we undertake to apply the new and emerging learning technologies for the benefit of all learners must address a number of considerations, among them are:

- the programs must be individualized and designed to dynamically respond to the learning needs as demonstrated by the competencies or deficiencies of the learner;
- there must be access to detailed learning management information

including level of achieved competency and provision for demonstrable outputs (portfolios);

- there must be a high degree of multi-media interactivity;
- there must be provision for prompt and intermittent positive reinforcement and avenues for tangential exploration;
- there must be highly motivational content, presentation and simulation modes;
- there must be the ability to extend opportunities for access to quality learning beyond traditional settings into homes, workplaces, community learning centers and ultimately, statewide;
- there must be provision for the extension of learning time on task beyond that afforded by traditional institutions on-site;
- there must be new forms of assessment developed that are aligned with the new learning modalities and content.

Of particular importance in today's economic environment, our efforts to deploy learning technologies need to clearly demonstrate increased learning productivity and increased productivity of SUNY's teaching faculty in order to:

- **unequivocally indicate a high demonstrable return on the public's educational investments.**

This is a particularly sensitive area since there is a growing body of evidence that illustrates that K-16 learner performance and job readiness is declining in the face of dramatically increasing public investment in the traditional public K-16 education model. There are often significant sensitivities to the inclusion of this element as a "system requirement" that relate to collective bargaining issues and the fear of job displacement. These are not totally unfounded and provide an indication of the magnitude of the barriers to be confronted. **One must keep in mind that it was not the bank teller's union that fought for the enhanced consumer access and productivity yielded by the installation of ATMs across this country.**

In reference to the technologies that can be integrated as tools for education and training, there seems at this point in time to be no limit on the media forms

or delivery means open to our consideration. Audio, video, computer, graphics, and telecommunications technologies all can contribute to enhanced quality of the learning experience, increased productivity, and improved access to learning opportunities. Figure 1 appeared in a recent issue of USA Today and illustrates an example of how one company views its future in the multi-media environment that integrates a variety of technologies and communications mediums. You will note that one of the "on-demand" services is **education**. Figure 2 also indicates the activities of the Baby Bells in reference to cable and entertainment investments, thus illustrating the inevitable convergence of these highly accessible, multi-media, motivational technologies. No doubt you have read about other joint ventures including software and hardware producers, all geared to deliver interactive multi-media into the home. One of these is called the Lightspan Partnership which includes Microsoft, TCI, Comcast and three venture capital firms. Lightspan has just announced that it has signed up schools in six states to conduct tests this Spring. Lightspan currently has 80 hours of multimedia educational programming and is intending to develop a total of 1,200 hours. With this convergence of telecommunications capacities and the lucrative commercial incentives for pursuing it, the timing is right for SUNY to exercise community level leadership to aggregate markets (always attractive to commercial providers) and insure that education is high on the list of these commercial applications.

In terms of collaboration, one can read every day of new private sector collaboration emerging across industries. Figures 1 and 2 provide some indication of the extent to which industries are considering merging, being acquired, or pursuing significant joint ventures to position themselves for the future in this hybrid technological environment. **SUNY can ill afford not to pursue similar collaborative efforts designed to shape the applications of these new, integrated, multi-media technologies to directly support education and training activities within the community.** Such leadership will insure that the requirements of the education and training enterprise drive development of the new and emerging technologies to deliver learning opportunities in their most sophisticated forms to a variety of community sites.

Where Are We Now? (Myth and Reality)

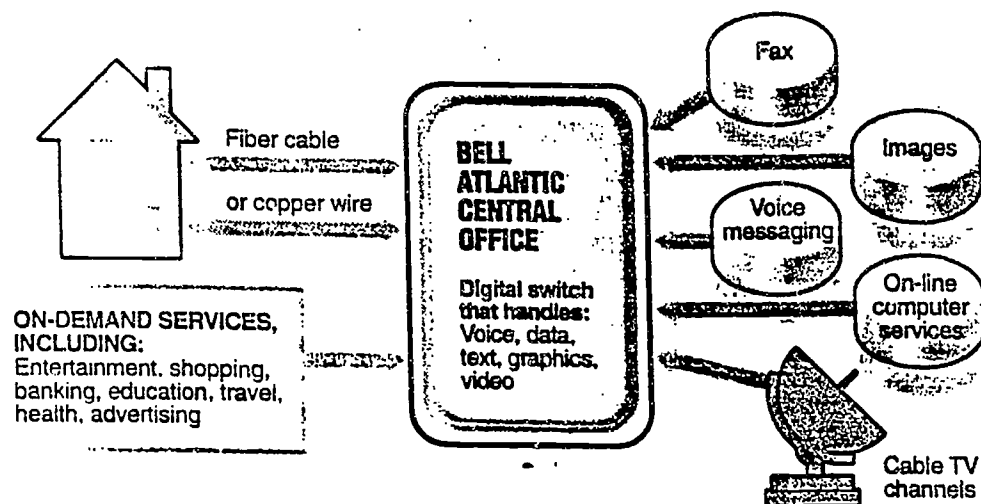
At the institutional level, we have seen an evolution over the last decade and a half that began with online access to services such as Control Data's Plato System and other mainframe driven education and training applications. That evolution moved through phases that included (1) widespread use of stand alone

Figure 1

Ruling opens door to union of telephone, cable, video

How Bell Atlantic sees the future

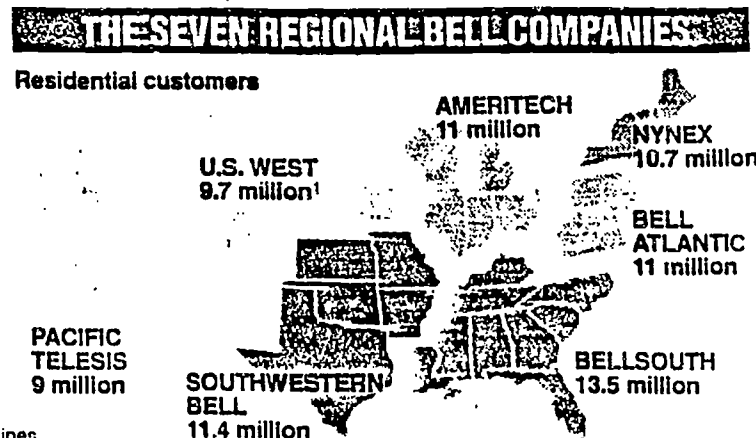
The regional phone company plans to offer everything from ordinary phone conversations to interactive services, such as movies-on-demand, via existing phone lines and a fiber-optic cable network it wants to build. A simplified view of how the network might look:



“The walls are coming down and here’s one of the bugles being blown.”

— Gus Hauser, who runs Hauser Communications, a cable company in Bell Atlantic’s territory

1— Number of residential phone lines



Source: Bell Atlantic, USA TODAY research

By Marty Baumann, USA TODAY

Figure 2

Baby Bells' activities in the cable and entertainment industries

	1992 REVENUE (billions)	1992 OPERATING CASH FLOW* (billions)	CABLE/ENTERTAINMENT VENTURES SO FAR
Ameritech	\$11.15	\$4.38	—
Bell Atlantic	12.68	5.05	Has five projects to deliver video programming in New York, New Jersey and Virginia
BellSouth	15.15	6.21	—
Nynex	13.16	5.05	Invested \$1.2 billion in Viacom; is also the largest cable provider in the United Kingdom
PacTel	9.95	4.04	—
SW Bell	10.02	4.12	Owens cable properties in U.K., Israel; is buying two cable operations near Washington, D.C.
U S West	10.28	4.29	Bought 25% stake in Time Warner, owns cable properties in U.K., France, Hungary, Norway, Sweden
TOTAL	82.39	33.13	—

*Operating cash flow is revenues less operating expenses excluding depreciation and amortization

Source: Kidder, Peabody & Co.

microcomputers (which significantly complicated the life of teaching faculty all across the country), (2) the "broadcast" of learning at the elementary, secondary and post-secondary levels on a national scale, (3) an integrated learning system approach, and now what appears to be (4) a technology/applications integration that includes multimedia applications in an interactive mode delivered in ubiquitous fashion via a variety of telecommunications mediums. This evolution in the public, K-16 education sector has been fraught with misunderstanding, overselling by the public and commercial sectors, and public sector expectations considerably out of line with public fiscal and technical capacity. As this evolution of learning technology applications moves further into an integrated learning arena that draws upon multimedia delivery systems, it would be well for us to **keep in mind some of the historic difficulties caused by the discrepancy between the technology myths and the demonstrable return on the public investments achieved by some of our most visible applications.**

For example, in the 1980's, with the widespread introduction of microcomputing, public education, parent/teachers associations, and alumni groups went so far as to hold bake sales in order to purchase microcomputers for their children's classrooms. State education agencies all across the country measured the degree of their resident public school commitment to technology (and supposed return on public investment) by a ratio illustrative of students per microcomputer at the district, campus and state levels. This metric did not take into account the facts that the computers may not be used at all (as was the case in New York City), that software may not have been educationally sound and that, from a classroom management point of view, these stand-alone microcomputers caused chaos for faculty seriously trying to make a difference for their students. The rush to use and install stand-alone microcomputers resulted in the faculty members struggling to find acceptable software and training in its use. Having found that software, students worked individually and thus, if time were available for all students to use the microcomputer(s), at the end of the school day, 25 to 100 separate students disks held the secrets of how each student performed. Unlocking those electronic student experiences required that the teacher use the stand-alone computer in the building (or have one at home). Little wonder there has been resistance to the infusion of learning technologies into the schools and colleges. In time, as networking technology improved and multi-disciplinary integrated or server-based learning systems emerged with graphics and sound, learner management information was captured automatically and detailed reports available at the individual class, campus or district level.

Now at the K-12 and post-secondary levels, we see a similar evolution with

what is popularly known as "distance learning." The most widely used distance learning model today consists of satellite or video distribution of a live teacher with two-way audio interaction between teacher and distant students made possible through audio bridges and remote telephones. These services are frequently augmented by the use of voice mail, electronic mail, computer conferencing, keypad response devices or voice mail systems, to allow for student-to-student or student-to-faculty interaction at times other than the airing of the live instructional broadcast. This model, augmented by computer and telephone interactive technology, is a basic broadcast model. It is a model that originates a live teacher in one location and distributes the signal to multiple locations equipped for interaction through phone and other technologies. The model, unlike those associated with the use of more sophisticated interactive technologies, does not (as popularly advertised) create a "paradigm shift." Indeed, the traditional instructional paradigm remains essentially unchanged.

Rather than shifting to a new and improved instructional paradigm, the popular distance learning model merely extends the current paradigm which has been in place for over 200 years. One reason why all of the expenditures and enormous amounts of human resource commitment have left the traditional instructional paradigm essentially unchanged is because the initiatives were not accompanied by adequate efforts to examine the traditional beliefs about instruction or learning and the contexts where they might effectively take place. Therefore, the technology has been for the most part used as an add-on, as an instrument of administration and less frequently instruction, and not a mechanism and opportunity for dynamic change and re-engineering of the public K-16 education model. Active participation of professional educators (not "electronic pipe-fitters") can insure that future applications are educationally sound.

It must be pointed out that though the current distance learning model does not create a meaningful (and much awaited and often cited) paradigm shift, it has provided access to education and training opportunities that might not have otherwise been available to students, working adults, or corporations for improving employee performance. However for SUNY, as a statewide system with the objectives of enhancing educational quality, access and productivity, and with the desire to apply the learning technologies in a creative way to support educationally sound practice, this extension of the traditional model is not sufficient and cannot be our goal. In point of fact, the extension of the current model through the popular configuration of distance learning is diametrically opposed to many elements of what we know to be sound learning practice supported by substantial educational and learning theory research. In fact, much of what is aired live today in the name of "distance learning"

would likely be just as effective if delivered on videotape.

For example, the broadcast model of distance learning does not include individualized programs that adjust dynamically to student learning performance. In fact, current distance learning programs in the broadcast model significantly decrease individualization and substantially reduce the degree to which a student can be interactive with his or her instructor. In addition, the programs are frequently of little motivational value, do not have any provision for addressing prompt or intermittent reinforcement, do not extend time on task, and do not provide individual or group information related to student achievement of competencies and do not capitalize on the technology to extend learning beyond the traditional learning sites. In short, what has become extremely popular across the country and supported by multi-millions of dollars in federal, state, and local public funding is truly not founded in sound educational theory, practice, or research. Perhaps most disturbing is the fact that this enormous investment in the application of educational technology has not contributed to improved pedagogy or a shift in the instructional paradigm to achieve the objectives related to enhanced quality, access or learning productivity.

As these examples indicate, it is very easy to get caught up in the myths of technological "silver bullets". The most serious consequence is the diversion of substantial resources away from the true mission of public K-16 education. The focus becomes superficial and often reflects frequency distributions and broad geographic (political) reach as measures of effectiveness. Unfortunately, those numbers quickly become accepted as a replacement for qualitative learning data or portfolios demonstrating student competencies and/or successful job acquisition. These latter outcomes are truer measures of the return on public investment.

For example, many popular distance programs and projects today typically site as a level of "effectiveness" the number of sites they reach, the number of states in which the signal is received, the number of students participating in the courses, and the number of hours of programming offered. This data has little or no relevance to the quality of the program, the level of productivity of the student or faculty member, the competencies achieved by the learner or the resultant return on investment for the citizens of New York or the country. It is ironic that we, as educational scientists, get caught in the flow of technology use to a point where we use such imperfect and misleading measures and cite such irrelevant data to justify the expenditure of our public dollars.

All public and private enterprises have a propensity to apply technology,

and sometimes do so prematurely and for the wrong reasons. However, in this case, there is clear evidence that the application of technologies and the commitment of significant public investment, though addressing an objective of instructional access, is contrary to accepted learning theory and practice and merely extends an ancient and outdated model.

Further pursuance of these models will only serve to illustrate that we have lost our identification with the basic mission of our educational and training enterprise and neglected our obligation to protect the public investment. Public education exists to provide quality educational experience. Quality must be defined by what the body of assessment and market economy data indicates. In short:

- Quality education must yield competencies at the learner level.
- Competencies must be demonstrated by learner performance.
- Ultimately, learner performance is reflected as productive work in the workplace.
- Productive work contributes to a competitive enterprise, one that likely contributes to a healthy economic environment.
- A healthy economic environment is a major characteristic of a mature and peaceful society.

NOTE: If there is any doubt in your mind about the "connection" between the first and last items above, "go-to" page 4 and reread the results of the 1994 industry survey undertaken by the National Association of State Development Agencies.

If we continue to merely extend the traditional instructional model with technologies that have the power to do much more, we must realize that in so doing, we lose touch with the goals of our profession and neglect the focus on learners. Since education is the prerequisite and essential foundation for achieving the valued outcomes related to competencies, performance, productive work, a competitive organization and a healthy economic environment, our loss of focus on mission can have devastating effects on New York's economic health. As we move forward in our attempts to effectively apply the new and emerging technologies to the community learning enterprise, we must not lose the focus on the individual learner regardless of age, level of learning, or location.

Collectively, the recent K-16 history in the popularized educational technology arena indicates that we have lost that focus and it is time to renew it through strong community leadership.

III. Some Community Learning System Requirements

Taking into consideration the convergence of the new technologies, and considering what we do know about educational needs and sound educational practice, there are several requirements of a community learning system design that we should adhere to as we engineer the new learning environment. Some of these requirements are:

- system design provides for the faculty member as a prime architect and manager of learning applications;
- communications is a foundation application of the system;
- access to electronic data beyond the community is enabled;
- learning experiences tailored to the learner;
- use of multimedia technology;
- real time and asynchronous interaction, simulation, and feedback;
- extension of the traditional learning day and the traditional learning year;
- basing success and progress on achieved competencies rather than temporal measures (elapsed seat time);
- prompt assessment and reinforcement;
- capacity to extend the full sophistication of the learning system beyond the traditional K-16 campus sites and into the community;
- ability to handle content in multi-disciplinary modes;

- presentation of material in various sensory modalities determined by learner preference and performance;
- presentation of learning experiences through varied strategies to include problem solving and exploratory learning.

With these (and other) learning system requirements in mind, the new community environment for applying this system extends well beyond the traditional campus and school settings. The new and emerging learning technologies allow for delivering sophisticated learning experiences to a wide variety of audiences in a wide and varied number of settings. **Figure 3** indicates some of the audiences and locations for which the community learning system should be designed. Though the new and emerging systems will have a capacity to reach multiple audiences in varied settings, if the public K-16 education system is to embrace these new technologies and capacities, they must build from the current traditional system on a campus in the classroom to a community-wide, lifelong learning environment...one that will ultimately begin to define "SUNY as a virtual university system".

As collaborative community projects evolve and become supported by the emerging learning technologies, the distinctions between the organizational bounds will blur just as is evidenced by the nature of communications now enabled through multiple channels of electronic access. As this phenomenon materializes, individual citizens and the business sector will benefit from the genesis of a "Virtual Community Learning System." The financial industry provides some indication of the direction of this evolution since its electronic consumer service points (ATMs) rarely serve but one banking organization. If you have used such a device, you are acutely aware of how it has improved efficiency and access to service. At the same time, it is unlikely that you ever noticed what additional banking interests were served, other than your own. That is the essence of "client-centered"!! **We must design and implement our community learning systems to be similarly learner-centered!!**

IV. Taking a Community Learning System Leadership Role

With the above as background to the general direction of technological convergence and its likely consequences for creating an effective community learning system, the following are some suggested concrete steps SUNY campuses

For Whom

- K-12 students at risk of failure in traditional educational settings
- Postsecondary students in need of remediation
- Workers seeking new job opportunities
- Public assistance recipients and members of families seeking employability skills
- Disabled persons
- Marginally employed workers
- Non English speaking workers
- Incarcerated youth reentering the job market
- Probationers and parolees

Where

- Home
- Workplace
- Colleges and universities
- Public and nonpublic schools
- Libraries
- Community-based organizations
- Correctional institutions
- Human service providers
- Skills center

can take to launch a community effort:

A. Clarify your mission/goals

In a concise mission/goals statement, make it clear that you will provide leadership for and facilitate the development of a collaborative effort to develop a community learning system intended to ultimately serve all lifelong learners in response to priority learning needs identified by the collaborative members. Indicate that you intend to conform to some basic strategies such as those outlined in Section I. Specify how improvements in access, productivity, quality and cost effectiveness will result from these efforts and how by so doing, you position the community to take full advantage of education, training and knowledge resources that are developing externally to the community, thus achieving the maximum return on public and private investments in the local learning enterprise (making positive those negative outcomes of inaction noted in Section I).

Examples of concise but inclusive statements might be:

Vision.....That all community members, regardless of their place on the lifelong learning continuum, have access to quality education and training opportunities to enhance personal productivity and their ability to contribute as a competent member of a competitive workforce.

Mission.....To work across all sectors of the community and with private technology/telecommunications providers to engage their cooperation in the planning and development of a community learning system that builds on the strengths of the existing public education programs and institutions.

Outcomes.....Articulation of education and training across numerous providers for all consumers; influence on the design of new and emerging services; substantial savings through community level cooperative purchasing; elimination of redundant networks and applications of technology and telecommunications; achievement of improved quality, enhanced access, and increased learning productivity, and a higher return on public investment than ever before realized by the system of public education.

B. Involve/organize the key elements in the community (and beyond)

Learning consumers and consumer institutions;

Other community K-16 learning providers;
Telecommunications providers (local/national);
Multimedia developers (local/national);
Collective bargaining organizations;
Health care providers;
Business and industry;
Public/academic libraries and local government;

C. Assess community learning needs

With community representatives, conduct a learning market analysis to determine what the education and training needs are, particularly those closely aligned with successful transition to higher educational pursuits and those related to job acquisition, improved job performance and mobility. Also, consider "process savings" across the community. For example, a number of community organizations are probably negotiating for phone, cable, software or hardware purchases. Why not form a Community Learning Purchasing Cooperative?

D. Develop your own community learning system requirements

Building on the requirements set forth in Section III, develop your own set of system requirements.

E. Review current/emerging technologies/telecommunications applications

Draw upon community expertise and invite presentations of new and emerging learning technology applications and measure them against your system requirements and fiscal reality.

F. Assess current capacity

Collect information on current learning technology applications and the technical, fiscal and staffing implications for your intended development efforts. Extend this assessment to include all K-16 providers as well as the capacities (current and projected) of the telecommunications providers serving the community (phone, cable, wireless, etc.).

G. Challenge assumptions

With the background of experiencing the benefits of the foregoing tasks and prior to determining where your focus will be, explore questions and ideas that challenge the "business as usual" mentality. For example (adapted from M.Gell, British Telecommunications Laboratories) some might be:

- Why do we have dozens of lecturers on numerous campuses delivering substantially the same material? Is it not possible to have students and staff teleported to common work spaces for interaction thus saving valuable time for other activities such as research and consultancy, which generate new knowledge, understanding and revenues?
- Why should a student attend just one SUNY campus or just SUNY? Why not access dozens of specialists and research centers across the globe? Why not select from the best? Why shouldn't a student choose the faculty members to whom he/she best relates?
- What are the implications of the recently created virtual International Community College for SUNY community colleges? Should SUNY community colleges aggressively pursue course delivery through that emerging capacity?
- Why should SUNY bear the cost of a SUNY-specific state and local telecommunications capacity when phone and cable companies are installing fiber at a rate of over 80 miles per day every hour of the day.
- Why does lecturing have to be carried out in real time? Why can't students access the SUNY education and training multimedia "jukebox" any

time of day or night?

- Why should there be investment in new SUNY buildings if the learning customer bases are extending globally and can access learning opportunities through tele-importation?
- Why should we invest in new research library facilities when state-of-the-art libraries are now electronic and online? Why not consolidate the physical facilities of the public, university and school libraries?
- When will SUNY provide 24-hour, 7 day a week virtual school or training enterprises offering multimedia instruction, simulations and self-assessment facilities?
- Why should state tuition assistance only apply to learning opportunities originating in New York? Why not determine eligibility based on the New York residency of the learner?
- What will happen to "accredited programs and degrees" or approved State Curriculum in the 11-16+ education levels when New York learning consumers choose to build an individualized learning curriculum designed to suit their individual lives or prospective/current employer needs?
- Why is it important to have a SUNY campus within 50 miles of every New York citizen when many course offerings can be delivered to the learning consumer's home, workplace (or car)?
- How can SUNY merge traditional and virtual approaches so that people, groups and communities can benefit and we achieve the highest return on the public's investment?
- When will SUNY begin tele-exporting educational programs on a national and international scale to help keep resident tuition/fees at a minimum?
- When will SUNY students actually be employed by the businesses they are preparing for as part of their "educational preparation?" Tele-participation in work or tele-importation of learning at work sites can support this now.

Questions of this nature frequently solicit no definitive answers (and may ruffle a feather or two), but given what you have learned at this point in the process concerning the "digital world and its' promise" (and likely before this experience), many of them are overdue in the asking.

H. Prioritize applications

Align the priority of learning system applications with the community needs and fiscal reality. Don't go overboard!!! Often the exotic "visions of what can be" are adopted as priorities rather than addressing first needs first with extant technology. In the U.S. probably the best (worst) examples are the proliferation of K-16 educational administrative computing networks and the Denver Airport automated baggage system. Start with exploiting the capacities that are already in place, for example:

- The Community Learning System Purchasing Cooperative suggested above (IV, C) is a simple yet very profitable step that does not require the application of any technologies. However, it indicates to vendors that education is important, permeates all aspects of the community and that educators understand the basic principle of a market-based economy... higher volume, lower price.
- One of the best audio applications of a community system might be putting in place a voice mail system that allows for K-16 faculty to (1) "post" assignments for students and parents; (2) "broadcast" community learning system announcements; and (3) provide "secure" mailboxes for faculty/student, faculty/student/employer, and faculty/parent exchanges. Many K-12 school districts implementing voice mail of this nature have demonstrated improved attendance, increased homework completion rates, greater parental involvement and decreased drop-out rates. How's that for return on public investment by just using the phone?! (These demonstrable outcomes are the main reason why basic "communications" is included as a foundation requirement for the Community Learning System-page 14)
- A simple video application can be the use of the public access TV channel. If it is not the case now, it is likely that your cable company will install "headend" equipment on your campus or provide access to their studios to allow for originating a wide range of learning and community involvement programs. SUNY advanced placement, remedial assistance,

homework hotlines, test preparation, informational programs, programs that complement the voice mail capacity, in-school and on-the-job learning, and business recruitment programs. Think of it, your own community education channel! In fact, since many adjacent cable companies are inter-connecting, your programming might reach several communities in the region. Consider what Ted Turner has done with his initial single channel!!!

- Quite apart from a technical system application and well beyond a purchasing cooperative, the "Learning System Collaborative" should seize the opportunity to forge developmental, producer/consumer relationships with public and private telecommunications and educational multimedia developers. The commercial efforts to harness these emerging capacities for educational purposes on a national scale very often do not have benefit of professional educator design assistance and likely are not driven by the learning outcomes we envision. The collaborative is a unique collection of expertise that can be of great assistance to the commercial design teams and beta testing of new products and services would be an option for your community and campus. In the 1980's, New York State passed legislation to encourage participation of educators in product/service design. Known as the "Teacher Summer Business Employment Program," it was administered by the Department of Economic Development and provided reimbursement to New York companies of up to one-third (with a \$3,000 per teacher cap) of what they paid a teacher in the summer to work on product development and testing. This program attracted dozens of New York-based educational publishing, software and hardware companies and was a significant step toward development of a sustained "producer/consumer" relationship that grew substantially over the next several years. As a result, many educational software products reflected New York State curriculum and objectives and the educational designs were consistent with sound practice. SUNY could be instrumental in developing such cooperative development arrangements with industry and benefit from revenue generation (for applying SUNY's developmental assets, conducting beta testing and residual royalties).

In support of this producer/consumer notion related to PC networking via cable systems, in a recent interview David Masotti, Vice President of Rogers Cablesystems, Ltd. said:

"We're hooking up a bunch of schools for free. Kids are early adopters; they're not a tough sell. Get them accustomed to online access at school, and they'll come to expect it

at home and work as well."

Jim Ginsburg of Jones Intercable echoed that sentiment by saying:

"Right now people tend to say about things like CD-ROM, we'll buy them for the kids. There's a bit of a generation gap between those who can afford this service and those who really understand its value, and that's kids."

Though educators surely have different motives than are reflected by these comments, the community collaborative approach (market aggregation) is unique. Thus, valuable developmental partnerships would be attractive to commercial firms in the tele-learning business and SUNY can be instrumental in forging them.

The above suggestions are not intended to belittle the exciting home-delivered multimedia efforts such as those of Lightspan, Viacom and others. Nor are they intended to discourage design of fully interactive community networks capable of voice, video and data with "on-ramps" to the national and international nets. Rather, they are intended to illustrate that there are cooperative programs and affordable initiatives that can serve to launch a community learning system using existing 20th century capacity.

In short, address real needs with real, proven capacity and remember a community learning "system" has many technical (phone, cable, wireless, satellite, fiber, computers, software, etc.) and program (K-12, community colleges, universities, industry, private training facilities, tele-imported learning programs) components. What makes those disparate technical and program components a community learning system is leadership.

I. Prepare budget and revenue source acquisition plan

Many public and private community organizations are now committing substantial sums to fragmented efforts to achieve education and training. Those can be included in a fiscal reallocation and cooperative purchase plan to address revenue acquisition requirements. Also take into account state and federal programs to support learning technology

applications. Remember that your broader consumer base will reveal additional revenue sources (library, local school, social service, workplace literacy, adult education, school-to-work, etc.) and will also provide a broader base for (1) negotiating prices and service rates and for (2) amortizing the community learning system components over time and applications.

J. Develop an implementation and assessment plan that includes:

An organization and management structure;

Faculty and consumer training and support services (customer service);

Policies and procedures that reflect the broader and more flexible learning context;

Maintenance and upgrading procedures;

Learner performance assessment procedures in relation to investments made (current and previous);

Specific timelines and milestones of all elements of the plan.

The above ten steps reflect a typical planning model. However, the value of this model and actively pursuing these steps is embodied by the fact that it is being done within a community context, not by a SUNY campus without regard for the broader community needs and capacities and not by a SUNY system without regard for the need to consolidate programs. To pursue a "campus technology plan" without doing so in the broader community context ignores currently available capacities to serve your needs and isolates the campus from the potential relationships and benefits described above. Most of those benefits accrue to the fiscal "bottom line" and cannot be ignored, especially in the current fiscal environment. One prime example is a cooperative community effort that leverages the Cooperative Service State Aid (as much as 80% for local school districts). Developing positive relationships with BOCES can achieve this tremendous incentive for local school participation in a network with SUNY campuses. This "shared service" fiscal incentive in a short time would easily eclipse the current state funding levels

likely to be available to the campus for distance learning delivery.

V. It can and must be done?

Without question, community lifelong learning systems can and must be developed. In these tumultuous times, the historic preoccupation with educational technology applications for administration and management is giving way to the cry for creative educational leadership. Few in the community are better prepared to shoulder this leadership responsibility than SUNY campus leadership. Adult learning, technical training, workplace literacy, homebound instruction, and community learning sites have long been within the purview of the K-16 educational administrator, SUNY administrators included. Who else will lead this revolution and avoid those negative outcomes that ultimately lead to economic failure? At a recent conference in the U.K., Michael Gell of the British Telecommunications Laboratories put it well:

Economic activity relying on the deployment of unskilled labor is extremely unlikely to form the base of healthy and sustainable social structures capable of withstanding the incessant pounding of future global market forces. The requirement is for new forms of rapid and high density learning, education and training in support of the new rapid creativity industries, many of which will be small and may be in the home. It, therefore, follows that the education and training sectors need to be transformed into an all-pervasive, boundary-crossing learning and creativity enterprise. The future economies cannot afford for the learning and creativity sector to be ring-fenced and separate from the rest of society in the way it is today.

Never in our history has there been the opportunity that now presents itself to integrate our education and training enterprises to achieve a higher order of educational quality, productivity and access within a context that represents a profound improvement in the public's investment return. This is underscored by the levels of investment return the public has grown impatient with as evidenced by local budget defeats, state and national program cuts at all levels of the K-16 system, the elimination or reduction of state and national educational program funding, and the growing likelihood that some form of "voucher" or "credit" will be available to support parental options to the current public system.

The technologies themselves can be intimidating and their rate of change frightening. However, in communities across the country, bold educational

leadership is focusing on the demonstrated capacity and working with others in the community to minimize the fiscal risks in order to play a vital role in shaping the new learning enterprise. As noted above, the requirement is for *new forms of rapid and high density learning, education and training in support of the new, rapid creativity industries, many of which will be small and may be in the home.* SUNY can take a leadership role in engineering those high density learning systems. If, as public, professional educators we do not, others will.

The education industry is too fundamental to economic success and becoming far too competitive to assume it's "business as usual." Those making that assumption in today's environment are usually soon "out of business." Consider the implications of a bankrupt K-16 public education system in New York State!

"The SUNY system must choose now whether to follow the old byway or the super highway in instructional technology. The latter is the fast lane to the future..."

Joseph C. Burke

APPENDIX

SUNY Community and Statewide Learning Technology Projects

I. Cable/CAI Cooperative Development Project

In an effort to address the inadequacies of the broadcast distance learning model, in 1990 the State University of New York began exploring how the TV model might be converged with an inhome computer assisted instruction capacity. During the course of that exploration, SUNY became familiar with the Computer Curriculum Corporation's interactive, multimedia integrated learning system. That led to the creation of a cooperative development effort with Instructional Systems, Inc., the eastern distributor of CCC.

A cooperative developmental relationship emerged in 1991, the purpose of which was to determine how, with current technological capacity, SUNY and ISI might begin to move the instructional model to more closely approximate the requirements set forth above. In pursuing this model, the deficiencies of each of the stand-alone capacities were addressed, in particular those of the SUNY distance learning model which adhered to the broadcast design discussed above. Developing this design also provided the opportunity for SUNY to gain experience in a new educational frontier where teacher training requirements would be drastically changed. This experience was deemed to be necessary if SUNY and its teacher training institutions were to keep pace with what promises to be a true shift in the instructional paradigm.

The SUNY/ISI collaboration was manifested in the Syracuse City School District at Nottingham High School, where it was determined that the mathematics content area was of highest priority. Therefore, the Math Sequence I curriculum was selected as the focal point for these developmental efforts since it also represents an area of high priority on the national level. In order to extend the learning opportunity beyond the school and into the home, it was decided to use laptop computers. Though the full multimedia capacity of the CCC system would not be available via phone lines to the home, it was determined that in this initial stage, the technology would be used to its current capacity to achieve the requirements. Students in need of supplemental assistance with the mathematics curriculum were selected to participate and provided with

laptops for home use via phone line. To add the element of the live teacher into the home, the participation of Adelphia Cable Communications was solicited to provide one hour a week during the school year. Thus, Nottingham High School created a program known as "Mathematics TV Teacher" aired for one hour every Wednesday evening that school was in session. The live TV teacher used the CAI student management information collected from school and from laptop use in the home to make determinations as to what content would be focused upon in the one hour weekly sessions. Therefore, the one hour was not a prearranged program planned weeks in advance, but rather a program driven by the performance of students as reflected in the student management information collected by the CAI system. Though the program was available to all students in the community via the cable system, the content was of particular relevance to those students selected to participate in this pilot developmental project since the program content was derived from their performance data generated by their inhome laptop use. This same model is now in operation in New York City Districts #12 and #5 with cooperation from Cablevision of New York City and is being expanded to include the elementary level and science curriculum.

There are many elements of this extended learning environment in Syracuse, New York City and elsewhere that are departures from the traditional educational model. For example, taking home valuable computer equipment for use in the home required the acknowledgement and participation of parents in this experiment. This additional degree of responsibility required considerable forethought to execute efficiently. Most parents were extremely enthusiastic about the participation of their children and equipment loss and damage was minimal. The project was designed to extend the school day and learning experiences for those students in Math Sequence I deemed at risk of failing. Therefore, this experiment was an attempt to directly address the learner needs and was viewed as a positive step by school professionals, parents and surely by Adelphia Cable, which provided the air time for the live teacher.

Preparing the teachers to participate in this multimedia project, which included appearing and "performing" on television and mastering the multimedia CAI system, also required considerable effort. SUNY, in conjunction with the SUNY College at New Paltz, the New York State Theater Institute, and television production staff at SUNY's New York Network, developed an institute consisting of a five day program entitled, "Teaching and Learning on Television," which included topics related to the methodology and pedagogy of distance learning, resources for TV teachers, copyright and intellectual property issues, performing for the camera, production of video-based instruction, and familiarity and use of the computer assisted instruction program. This program was offered as a

summer institute in 1993 and again in 1994. It was attended by the Syracuse teachers participating in the project, as well as by teachers from districts in New York City and Boston who were implementing the program in 1994. In addition, the institutes attracted large numbers of SUNY faculty members who were interested in or participating in distance learning programs on their campuses.

Though this initial effort commenced in 1991 as an application of the technology that existed then and, therefore, used delivery via cable and phone system to accomplish, recent developments indicate that we will soon be able to achieve a vision such as the following which is the goal of this project:

Karen Johnson is a fourth grade teacher in Buffalo, New York. She has been trained on a sophisticated integrated learning system that includes a high level of student motivational, interactive, video, graphics and audio reinforcement. Karen's students used the system at school and in their homes. Some of Karen's students are adults and they use the system at their workplaces. The home and workplace access has been provided through the cooperation of both the phone and cable companies that serve Buffalo through the magic of fiber optics and digital compression techniques. Since in-home systems are not expensive, they have been provided to students deemed to be at risk of failing and funded by Chapter 1. In the workplace, those employees most in need of basic skill competency upgrading were selected and that program is funded by state and federal workplace literacy programs. Karen is able to easily monitor the progress of her 125 students by virtue of the student management data that is collected and reported to her at regular intervals she has predetermined. In this case, the "electronic report cards" go to her, not two or four times a year, but weekly. These reports indicate precisely where each learner is having difficulty on a series of objectives and Karen can ask that students having similar difficulties be listed for her so she can target some special attention to those specific learners. In order to provide congruence for the students with the computer curriculum and their classroom curriculum, Karen is able to use the student CAI reports to create an individual education plan (IEP) for each student. For one or several students having been identified as having difficulty, Karen, through her system interface, asks that the next time the student "signs on," that she be alerted through an audible "urgent message" indicating that the student in need is on the system. When so notified, Karen enters the student ID number and requests access to the student's

active screen. In seconds, Karen appears in a video window on the student's workscreen and ... "Hi Sally, I see you are having some difficulty with multiplying fractions. Let's see if I can give you some help and maybe show you a brief video segment that will help you understand the rules we need to keep in mind."

This vision has moved one step closer through this cooperative project between SUNY, Instructional Systems Incorporated, local schools, cable and phone companies. Moving us further toward achieving this vision recently, Computer Curriculum Corporation (CCC) and Zenith Electronics demonstrated the role that the emerging information highway can play by demonstrating low cost access to local area networks over standard cable TV home subscriber facilities. The CCC software is fully compatible with Zenith's communication products and opens new doors for the delivery of education into the home. Children will now have the ability to use the full CCC multimedia software at home, in the classroom, in the library, or in any of the sites listed earlier. This year Viacom announced a similar educational, multimedia test to homes in California. These breakthroughs in multimedia educational delivery to the home announced in February 1994 is a clear indication that the cooperative venture between SUNY and Instructional Systems is moving in a direction indicated by learner needs and supported by sound educational practice and the technological capacity being developed today.

It is interesting to note that concurrent with SUNY's activities, Kodak Corporation was experimenting with similar CAI capacity in a plant in Rochester, New York. In September of 1992, Kodak representatives made a presentation to the staff at the State University of New York describing their effort to apply computer assisted instruction in the workplace to address learning deficiencies of their employees. The specific Kodak objectives were to close the basic skill competency gaps that were contributing to decreased quality of products and services and to generally enhance the foundation skills of all employees. Their voluntary program demonstrated overwhelming success in both learner performance and cost effectiveness. Their data illustrated that in their pilot with 100 employees, the cost for implementing the computer-based instruction was \$4,000. Similar costs for the implementation of a traditional model was \$23,000. In terms of educational achievement, for every 100 hours of instruction, the traditional approach achieved one grade equivalent gain. Similarly, for every 100 hours of instruction on the computer assisted instruction system, there were gains of 8 - 12 grade equivalents. In the fall of 1992, Kodak reported to SUNY that they too were exploring on a pilot basis the installation of learning capacity in homes for their employees. The Rochester, New York-based Kodak workplace

program that yielded the positive results indicated above has now been expanded to a Kodak worksite in Massachusetts.

As a spinoff of the initial SUNY project and also in the Rochester, New York, area, SUNY is now participating with Rochester Telephone Corporation (Frontier communications), Instructional Systems, Inc., local schools, BOCES, the SUNY teacher training program at Brockport and the Monroe County Community College to expand upon the "Rochester Area Interactive Telecommunications Network" and pursue the vision noted above using ISDN. It is anticipated that in the coming months, a pilot test will be conducted in 100 households allowing children and adults to benefit from the access to the interactive, multimedia curriculum offerings. These offerings have the advantage of central learning management data collection which can support strong articulation with the in-school program. Indeed, it is possible to explore eliminating the disruption of the typical remedial (Chapter I) "pull-out" program by shifting some of it to this inhome model. The needs of the gifted can also be addressed since many schools can no longer afford advanced offerings.

This SUNY developmental effort and its evolution from two distinct mediums (cable/phone) to what promises to be one integrated network, and other evidence being generated by those implementing the new and emerging technologies across the globe, make it clear that we are on the verge of a capacity that can cause a true paradigm shift rather than a simple extension of the current pedagogical model. SUNY, with this developmental project, has attempted to make a small contribution to achieving that shift and preparing teachers to lead it.

II. Other Technology-Supported SUNY/K-12 Efforts to Enhance Learning Opportunities and Support Staff Development

The State University of New York has always played a prominent role in support of the public education sector. Of significant importance has been the emergence of the network of SUNY teacher training institutions which prepare and offer continuing professional education to a large share of the teachers in New York State. More recently (May 1994), in direct support of the public, K-12 education efforts to pursue A New Compact for Learning, the SUNY Board of Trustees approved resolutions aimed at achieving:

- Development of improved collaborative models of preservice and inservice teacher preparation and professional development appropriate to the schools of the 21st century;

- Enhanced campus work in collaboration with local school districts to articulate student performance standards and to help design and implement method of assessment that enhance student achievement.

These recently stated action objectives will surely yield a number of collaborative efforts where technologies can be productively applied. However, there are many such collaborative efforts underway at present and the selections described below are exemplary of those.

A. Distance Learning

A recent survey undertaken by the SUNY Presidents' Task Force on Distance Learning indicates that many campuses are involved or actively planning local/regional distance learning efforts in collaboration with the public, K-12 sector. Approximately six campuses currently have offerings for local schools delivered through a variety of mediums including cable, microwave and phone lines. Projects such as that noted above involving SUNY Brockport and a number of local schools are exemplary of the role broadband and ISDN capacities can play in enhancing offerings to local school students and staff. Those campuses reporting the offering of distance learning courses for local schools include SUNY Brockport, Herkimer County Community College, Alfred College of Technology, Canton College of Technology, SUNY Potsdam, SUNY Oneonta, and SUNY New Paltz. Others including SUNY Oswego indicated that they are in the planning stages.

There has long been strong relationships between SUNY teacher education programs and local schools. As the survey indicates, many of those SUNY institutions are now moving to electronic delivery of professional development opportunities. Other applications of the SUNY campus distance learning technologies are emerging in support of 3-1-3 programs which have operated in the "physically transport the students or faculty" mode for many years. With a SUNY focus on shortening the time it takes to secure a degree, applications such as 3-1-3 or advanced placement will surely emerge with greater frequency. These are applications particularly worthy of pursuit since (1) they make far more productive use of student and faculty time and (2) they have direct economic benefits for the parents of the students who ultimately attend SUNY campuses. That kind of incentive and support from the community is extremely valuable.

B. Regents Review Live

Several years ago, the Rockland, Northern Westchester/Putnam and Hudson River Teacher's Centers, in conjunction with Continental Cablesvision and TKR, created and offered a "REGENTS REVIEW LIVE" series that aired programs on each of the two participating cable companies to help students prepare for the New York State Regents exams. Two-hour review courses in U.S. Government, Spanish, Global Studies, Earth Science, Sequential Math I, II and III, Physics, Biology, English and Chemistry were offered first from the Continental Cablesvision studio and then from the TKR studio. In 1991, SUNY Central proposed a test of using the SUNYSAT statewide distribution capacity to air the series statewide. In so doing, the on-air teacher did not have to repeat their sessions and the number of participating students would be increased nearly 200 fold. A 1991 successful statewide test which aired the Sequential Math I review program has now grown into an annual statewide, live airing of the entire 22-hour Regents preparation series with the participation of nearly all cable companies in New York State. This straightforward application of existing public telecommunications facilities in conjunction with K-12 institutions and the private sector cable companies illustrates how collaboration can extend the benefits of existing programs to geographically dispersed students. Many communities where cable penetration is light, found that the local school district had a satellite dish and were willing to host Regents Review program reception rooms where students could participate in the live review sessions with their own teachers in attendance.

This statewide SUNY/K-12 model can readily be extended to support 3-1-3, advanced placement, and teacher training. The interactivity of such programming will increase substantially as terrestrial-based compressed digital systems are installed linking communities across the state. The NYSERNet plans to develop a statewide T-3 network and the SUNY plans to increase the number of campuses with access to the Albany uplink site will surely accelerate the development of these programs.

C. Satellite Delivered Professional Development

In 1991, SUNY Central in conjunction with Dr. Dennis Littky, Principal of Thayer Higher School in Winchester, New Hampshire, (and a nationally known "school reformer" associated with Ted Sizer's Coalition of Essential Schools), secured funding for the offering of a live, monthly, nationally-aired staff development series produced by SUNY's New York Network. At that time (and yet today) the "Here, There and everywhere" series was the first national teacher education program to originate live from a school. The monthly program represents a new teacher education model that transforms the traditional "lab school" into a dynamic, interactive network of teacher educators, pre-and inservice teachers, students, parents and other member of the community.

In 1994, with funding from Annenberg, Dr. Littkey and some of his staff migrated to Brown University where the Annenberg Institute for School Reform was created. Supported by Annenberg and the CPB Math/Science initiative and sporting the new name of "Educator's Guild," the series will now originate from multiple sites including New York City, Chicago, Los Angeles and San Francisco. SUNY may originate future teleconferences from Thayer High in Winchester, New Hampshire.

This SUNY experience and the resulting electronic teacher education model hold clear implications for SUNY's role in support of New York's school reform efforts. Many New York schools participate in the original "Here, Thayer and Everywhere" program and the New York local school audience will surely grow since programs now originate from the major urban school districts across the country.

A related and concurrent series was developed with the Albany BOCES. This series was supported with Federal funding and offered nearly 60-hours of live professional development, statewide, per year, covering topics such as Cooperative Learning in the Math/Science Classroom, Gender Equity in Math, Constructive Geometry, Family Math, Applying the New Standards of Excellence in Mathematics and Science Education to the Classroom, and many other programs over a four-year period.

With the emerging capacity to extend access to the SUNYSAT uplink to several SUNY teacher education institutions, these experiences stand as tested models found useful and accepted by dozens of schools in New York

and hundreds across the U.S.

D. The Great Lakes Collaborative

In 1991, SUNY Central, in collaboration with the Wayne County Regional Education Service Center in Michigan, was awarded a major role in the creating of a three state network of 81 schools connected via Internet. Each school site was awarded hardware and software to enable student and teacher creation and sharing of multimedia instructional materials in support of math and science curriculum. A central feature of the project is the "Explorer," a user-friendly software tool which allows educators and students to easily navigate their way through the maze of broad-based resources to find the right material based on curricula, learning objectives and grade level. These materials are available on-line immediately (or the software indicates where they can be obtained) and are interactive. Teachers and students are also provided access to a myriad of other information resources through Internet.

SUNY has played a role in the selection of the 23 school sites in New York State and provided the core of the staff development and continuing support services to the schools. A capstone event in 1994 was the conference conducted at SUNY Oswego entitled "Teaching in the Information Age: Linking K-12 and Teacher Education." This conference provided a unique opportunity for SUNY faculty and local school sites to share their experiences with creating multimedia materials and communicating and securing resources via the Internet. SUNY is now planning programs for 1995 that will also focus on the use of the Internet and K-12 schools staff will be invited.

The above SUNY projects provide an indication of current efforts to deploy learning technologies in partnership with, and in support of, the public K-12 sector. Those mentioned above have had involvement and in some cases funding support from the SUNY Office of Educational Technology. There are several other efforts that have been developed locally that hold promise for systemic SUNY/K-12 initiatives. Indeed, some 800 collaborative programs between SUNY campuses and local schools are described in the publication entitled SUNY and the Schools: A guide to SUNY/School Partnerships. In addition, there are a

number of other substantial SUNY system-wide initiatives that are directly aimed at support of public school reform efforts that, to date, do not have a technological component. Those efforts include:

- College Expectations: The Report of the SUNY Task Force on College Entry-Level Skills (1992) which lays out the information and skills that students should master before they enter as freshmen.
- College Transition Course, a flexible curricular outline being designed by a team representing SUNY, the schools, CUNY, the independent sector, the New York City Board of Education, parents and students. To be offered by high schools to their juniors or seniors to help ease the transition to college.
- College credit in high school is being offered by a number of SUNY institutions in addition to those mentioned above that use technology to do so.
- Integration of the last two years of secondary school with a college curriculum is being pursued by SUNY community and technical colleges for those students not planning to seek a baccalaureate immediately after high school.
- Performance-based assessment programs are being developed by fifteen SUNY college/school teams across the state. This is an effort to move away from multiple choice and short-answer testing toward students' demonstrating their knowledge more fully and persuasively in projects, demonstrations, and portfolios.
- The SUNY Mathematics Alert Program offers juniors a confidential assessment of their math skills in relation to the freshman math sequence for two majors at the SUNY campus of their choice. In 1993-94, the first year of the program, 335 high schools tested 40,000 students. This year, over 50,000 have already participated.

Many of these systemic efforts could benefit significantly by the appropriate application of technologies to enhance access and improve productivity. For example, the Mathematic Alert Program assessment component is a multiple choice, pencil and paper test that could easily be

converted to an online version at the local, regional or statewide level. This application of technology for data capture and aggregation could improve efficiency and enhance access for high schools and students desiring to participate. One might also consider (1) using the SUNYSAT system for statewide distribution of selected elements of a college transition course being developed by the team noted above, (2) offering selected advanced placement opportunities statewide (as is now the case for the "Regents Review Live" program and "SUNY by Satellite" business courses) to enable more equitable access to these opportunities, particularly for rural and urban school districts whose fiscal situation has caused the reduction of such offerings, and (3) using local/regional cable and phone networks to enhance access and improve efficiency of the Tech Prep, 3-1-3 and professional development programs.